

The Planters' Chronicle.

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THE U. P. A. S. I.

(INCORPORATED.)

Contents.

We publish the reports of two District Associations—Central Travancore and Mundakayam. The latter Association is especially to be congratulated in the inauguration of the Motor Transport Service.

The Scientific Officer, who is still on tour, has collected a very interesting summary on Nitrogenous Soil Constituents and their bearing on soil fertility from the U. S. Department of Agriculture.

The Manager of the National Bank of India has written to us as follows: "The Directors propose to pay a dividend for the half-year at the rate of 12% per annum plus a bonus of 2% making 14% for the year, to place to credit of Reserve Fund £50,000 in addition to the £50,000 added to it in September, to place to credit of Officers' Pension Fund £10,000 and to write off from the Premises Account £10,000, leaving £64,000 to be carried forward to the next account. The total nett profits to December 31st, 1912 amount to £324,000."

The Managing Editor on application will be happy to supply Pamphlets, Rules, and Application form of the European Defence Association. Branch Rules are in the Press. We hear that the formalities in connection with the Madras Branch are practically complete.

We have received the first number of the Ceylon Planters' Gazette, the official organ of the Ceylon Planters' Association and wish the Editor all success. It has begun well and its usefulness is bound to increase.

Mr. Hindley has written in reply to a question put by Mr. Tipping with regard to the use of saltpetre. He suggests the use of crystals in place of solution, and that in the case of hard woods saltpetre, just as it is bought, should be used. Dig a small hole directly under it, put a small fire in and cover with bark or sods. In the case of soft wooded trees he feels certain the results must be satisfactory.

DISTRICT PLANTERS' ASSOCIATIONS.**Central Travapoore Planters' Association.**

The Annual General Meeting of this Association was held at Kuduakarnam Bangalore, on Saturday, February, 22nd, 1913, at 10 a.m.

PRESENT.—Messrs. F. Bissett (Chairman), J. A. Richardson, H. C. Westaway, J. H. Ellis, A. R. St. George, J. S. Wilkie, W. H. J. Milner, R. D. Scoble Hodgins, F. W. Winterbotham. Messrs. H. C. Bracher, R. L. Goldsmith and A. Slater (Visitors) and R. P. Roissier, (Honorary Secretary).

The notice calling the meeting was read.

The proceedings of the last meeting were taken as read and confirmed.

HONORARY SECRETARY'S REPORT.

Mr. Chairman and Gentlemen.—During this year under review 7 Committee Meetings and 4 General Meetings have been held.

Roads.—It was decided at a Committee Meeting held on 1st October that the Road Committee should have their own Honorary Secretary and this was confirmed at the General Meeting held on 26th October. I accordingly handed over all accounts, cash and correspondence belonging to roads, to Mr. Haslam who was elected Honorary Secretary, Road Committee. This decision is to my mind a very wise one. I think that everyone will agree that never before have the Planters' Roads of Peermade been in such good order.

Labour Rules.—The same rules as existed in 1911 have been carried over. The rules have in the past been looked upon too much as purely Association Rules. It is, I think, to be regretted that they are not treated more as District Rules and that Estates outside the Association and in this district do not fall into line and agree to abide by these Rules.

Labour Rates.—The Committee have constructed a scheme for the revision of rates and this is to be brought up for discussion immediately.

Membership.—The Association consists of 13 members representing a declared acreage of 3,996 acres.

The Crop for 1912 is 3,190,280 lbs. from an acreage of 3,489.54 acres, this represents an average of 581.16 lbs. per acre.

ACCOUNTS.

<i>Receipts—</i>	Rs.	A.	P.
By Balance from last year	...	900	0 0
„ Subscriptions for 1912	...	1,149	2 1
Bank Interest	...	17	6 0
Refund from U. P. A. S. I.	...	9	6 9
	Rs...	2,075	14 10
<i>Expenditure—</i>			
To Expenditure for 1912	...	1,845	6 7
Balance to be carried forward...	...	230	8 3
	Rs...	2,075	10 10

Detailed Accounts are laid on the Table.

I wish to thank you, Gentlemen, for the honour you have done me in electing me as your Honorary Secretary and I now beg to tender my resignation.

Correspondence.—Read letter from the Assistant Secretary, Indian Tea Committee No. 170 T. C. dated 27th January, 1913.

Read letters from the Honorary Secretary, South Travancore Planters' Association, dated 18th November 1912 and 18th January 1913.

Read notice from Mr. W. Forbes Mackay *re* the Alleppey Regatta.

Read letter from the Honorary Secretary, Kanan Devan Planters' Association dated 4th December 1912.

Read letters from the Secretary, U. P. A. S. I. No. 39/12 of 20th November 1912; No. 40/12 of 28th November, 1912; No. 42/12 of 16th December, 1912; No. 1/13 of 13th February, 1913.

Read Circular No. 39 from the Indian Tea Association and it was agreed by all the members that in future they will have 'Pure Indian Tea' marked on all chests.

No reply having been received from the Excise Commissioner *re* the Kuttikanom Arrack Tavern, the Honorary Secretary was instructed to bring this to the notice of the British Resident.

Sri Mulam Delegate's Report.—Mr. Westaway informed the Association what had taken place at the Assembly and explained what had been done with regard to several items which had been brought forward which were of interest to this district.

Mr. Roissier proposed a hearty vote of thanks be given to Mr. Westaway for having so ably represented this Association at the Sri Mulam. Seconded by Mr. Ellis and carried with applause.

Labour Rates.—The revised rates as drawn up by the Committee appointed for this purpose were brought before the meeting and after each item having been fully discussed the rates were passed.

It was resolved that the Honorary Secretary write to Mr. Slater (Assistant Engineer, Peermade) *re* the building of Water troughs on the Ghat road.

Resolution by Mr. Westaway.—"That this Meeting records its appreciation of the very able way in which the Chairman and the Honorary Secretary have conducted the affairs of the Association during the past year and accords them its very hearty thanks."

Seconded by Mr. Richardson and carried with applause.

The Chairman at this stage said: "Before resigning the Chairmanship, I would like to express my thanks to the Committee for their advice and to the Honorary Secretary for the tactful and business-like way in which he has carried out his duties during the past year."

Election of Office-Bearers for 1913.—On a vote being taken the following were appointed:—

Chairman ... Mr. F. Bissett.

Vice-Chairman ... Mr. T. C. Forbes.

Hony. Secretary ... Mr. R. P. Roissier.

Committee ... Messrs. W. H. G. Leaby and H. C. Westaway.

With a vote of thanks to the Chair the Meeting terminated.

(Signed) REGINALD P. ROISSIER,

Honorary Secretary.

Mundakayam Planters' Association.

Minutes of the Annual General Meeting of the Mundakayam Planters' Association, held at the Chennappara Bungalow, on Saturday, 1st February, 1913.

PRESENT.—Messrs J. R. Vincent, (Chairman), W. A. Asher, E. S. Conner, Ed. E. Eyre, E. R. Gudgeon, Ashton Hamond, Eric Hall, R. Harley, H. B. Kirk, R. Lescher, C. Martin, Malcolm Smith, R. Tait, P. H. Vogel, Geo. West, and Edwin Vincent (Honorary Secretary). *By Proxy.*—Messrs G. H. Danvers-Davy and J. J. Murphy.

At the outset the Chairman proposed a vote of condolence with the family of the late Mr. R. A. Fraser of Kuppukayam, which was passed, all members standing.

Business.—The Minutes of the last meeting were taken as read.

The Honorary Secretary's Report.—The Honorary Secretary said :—

"Mr. Chairman and Gentlemen,—I will endeavour to be as brief as possible in presenting my report of the year's work as we have a good deal of business to get through to-day.

"First of all the following figures will, no doubt, interest you. Under Rubber alone the district comprises (exclusive of 1913 clearings) 11,895 acres Rubber, 472 acres Tea, and 145 acres of Tea and Rubber interplanted, a total of 12,510 acres which is an increase of over 1,500 acres on last year's figures. The native openings in the district have also considerably increased and I have information before me showing that at the close of 1912 these holdings amounted to some 1,700 acres. This brings the total area in the district under cultivation in Tea and Rubber alone to a little over 14,000 acres.

"I cannot compare crop figures with previous years as this information is not on the records of the Association, but the out-put in 1912 amounted in round figures to 360,000 lbs. Rubber and 730 lbs. Tea. These figures will show you what an important factor we have become in the Rubber world, and I hope that some successor of mine will be able to say the same with regard to Tea.

"The strength of the Association is 17 Estates with a membership of 32 (at the close of 1912) including Assistants.

"As far as subscriptions are concerned, I am pleased to state that although some Estates have been rather tardy in their responses to my appeals, all outstanding for 1912 are now in. I hope my requests for the 1913 subscriptions will meet with better luck and that members will send in their payments in good time this year.

"Speaking of tardy people, I am sorry to say that only Rs.205 were collected during 1912 for the Planters' Benevolent Fund by my predecessor and myself. I do not think there is any doubt in your minds as to the excellence of this fund, and I should like to see subscriptions coming in more regularly.

"The Accounts for the year are on the table and you will have the pleasure of hearing later on at this meeting, the report of the Honorary Auditor—Mr. H. B. Kirk. The very sound financial position of the Association will no doubt be appreciated by you all.

"With regard to the year's Secretarial work, at the beginning of the year the Tolls at Kanjirappalli Bridge were the cause of a good deal of trouble with the bandynen, which was, however, happily settled. During the year the Kottayam-Kumili Road from the 13th to the 29th mile has

been remodelled, according to the "Gazette," and Government has been approached with a view to having the road improved, now that planters are taxed in the shape of the Toll at the Kanjirappalli Bridge. I have had the pleasure of announcing at one of our Quarterly meetings that arrangements have been made whereby vehicles returning through the gates within 24 hours only pay one toll.

"Mr. Asher's requests with regard to the Lalam-Erutapetta Road have also been constantly before us as well as the question of establishing a Telegraph Office at Erutapetta. I have continually agitated Government and the Director of Telegraphs respectively with regard to these matters and hope for improvement. So far I understand that the Postmaster at Erutapetta has been empowered to transact Insurance and Savings Bank business, which is an indication, I hope, of the thin end of the wedge.

"Another question dealt with in the part of last year was the high rates of freight obtaining from Indian and Ceylonese ports to England. I am afraid the shipping combines are too strong for us to do anything this end, at least our representations have come to nought.

"The subject of Mr. Hamond's arrest was taken up very strongly with Government, but nothing can be done until the suit filed by the Contractor against Mr. Hamond is disposed of. I have asked Government for the case to be accelerated as much as possible.

"The next thing I have to speak about is the New York Exhibition of 1912. Unfortunately the district was not represented, members refraining from exhibiting, as many factories were still in course of erection and machine made samples could not consequently be sent. It may be of interest to you to know that Gold and Silver Medals of the Rubber Growers' Association, London, were won, I believe, by Highlands and Lowlands, and Rosehaugh Estates respectively, with samples of Smoked Sheet.

"The usual U. P. A. S. I. and Mysore Exhibitions were also held but only two Estates sent samples, one of which was successful in gaining a diploma. I understand, further, that some of the samples have been retained for the Economic Museum, Bangalore.

"There will be another Exhibition in London, in June 1914, and some pamphlets I have received in connection with it, are on the table. I have had considerable correspondence with the Organising Manager—Mr. Staines Manders—and it is hoped the district will be well represented. I shall have a proposal to make regarding this when the matter comes up for discussion.

"Other matters dealt with during the year include Mr. H. B. Kirk's complaint of delay in delivery of parcels, and I am in communication with the Postmaster-General on this subject. I have also approached the various newspaper firms with a view to being placed on their complimentary list but without success. I think a 'cuttings book' would be of great interest and use to future Honorary Secretaries.

"In August last we were very ably represented at the U. P. A. S. I. Meeting by Mr. G. H. Danvers-Davy whose report has been placed before you. With regard to our representation at the Sri Mulam Popular Assembly I have recently been in communication with the Chief Secretary to Government. For this year, at any rate, only one representative can be sent from the combined districts of Peernade and Mundakayam, but I hope the matter will be followed up and that in 1914 we shall have our own representative at this Assembly.

I had the pleasure of recording our appreciation of Government's action in appointing a planter—Mr. J. A. Richardson—to the Legislative Council, Trivandrum, and we are under a great obligation to Mr. Richardson for the good work he has done and is now doing for the planting community. A good deal has been said about the Labour Act of Travancore and we all await the result of Mr. Richardson's representations to Government in this direction.

"A meeting to elect a member for the planting community to the Legislative Council at Fort St. George, was held in December last and the members present unanimously voted for Mr. Richardson. Our nominee, however, was not successful, Mr. E. F. Barber, being elected by a large majority.

"As the result of direct representations made to Government by the Association, Messrs. S. P. Mel & Co., Mundakayam, were granted a license and the proximity of this shop to the Travellers' Bungalow is greatly appreciated by many of the community and others passing through.

"An important question was brought up in July by the South Travancore Planters' Association—that of seceding from the U. P. A. S. I. and forming a combined Association in Travancore. As you are aware, for various reasons, we did not feel disposed to do this.

"At our last quarterly meeting the question of subscriptions was brought up and it was decided to continue paying on our old basis. At that meeting also Mr. Richardson spoke on the question of Tobacco duties and I have since had some correspondence with the Chief Secretary to Government on the subject. From his letters I gather there is no likelihood of either the duty being removed or permission given to import Tobacco by post. Perhaps Mr. Richardson will have an opportunity later on of again taking the matter up with Government.

"At the meeting just referred to, Mr. A. W. L. Vernede was a welcome visitor and you were, no doubt, appreciative of his announcement that the Kanjirappalli Court House would, in all probability, be built on the present T. B. site at Kanjirappalli and the T. B. moved further back.

"A good deal of spade work has been done by your Committee and Officers during the year. We have seen the Motor Transport Scheme blossom into an accomplished fact and, I believe, working admirably. The Medical Fund has taken up a good deal of time but with excellent results, and another important work has been accomplished in the Revision of the Rules. The new book lies before you. In it you will find the new rule with regard to Private Members, and the Association is to be congratulated on enrolling its first private member in the person of Mr. J. A. Richardson.

"Another important Scheme which a memorable year has seen completed, or practically so, is the Scientific Officer Scheme. A year ago the cess seemed rather a heavy one but with the increased acreages we have been able to keep it down to an initial 11 annas per acre and 10 annas per acre subsequently. Only 90% of the acreage is participating otherwise another anna might have been knocked off the cess. I put it to those understanding that they would do well to come in.

"I am afraid my report is rather a lengthy one, but I hope you will agree that it is not owing to any undue verbosity on my part but the simple record of a busy year. In conclusion, I should like to record my great obligation to our Chairman, the Committee and the members in general, for their co-operation and with this, Gentlemen, I place my resignation in your hands."

Mr. H. B. Kirk moved the adoption of the Honorary Secretary's Report which was seconded by Mr. A. Hamond and carried unanimously.

The Auditor's Report.—Mr. H. B. Kirk said:—

"Mr. Chairman and Gentlemen,—Owing to the death of Mr. Fraser, who was appointed as my co-auditor, I was asked by our Chairman to undertake this work by myself. Prior to July 1912 the Association's books were kept in rather a haphazard fashion. Our present Honorary Secretary, Mr. Edwin Vincent, has reorganised the accounts, and placed them on a business basis, and I think we owe him a hearty vote of thanks for this.

"I would like to see a list of the District Subscribers to the Planters' Benevolent Fund laid on the table at the general meeting. I suggest that the acreage and rates of subscriptions should be entered in both the ledger and the journal against each item to admit of easy checking when auditing.

"I audited the books at Eldorado Bungalow on January, 2nd and certify them as being correct."

Mr. R. Harley moved the adoption of Mr. Kirk's Report which was seconded by Mr. West and carried unanimously.

The Chairman's Report.—The Chairman said:—

"Gentlemen,—Before recounting to you the results of my stewardship for the past year, I have a sad duty to perform and that is to ask you to rise in respect to the memory of our late member, Mr. R. Fraser, who died since our last meeting. We have been singularly unlucky and unfortunate in losing two good men during the year in the persons of F. H. Hall and R. Fraser, who were both well-known for genial good fellows, and whose places it will be hard to fill.

"As our Honorary Secretary has given us a thorough resumé of the work done by the Association during the year, and also what I hope will prove interesting figures of acreages, Members, Estates and crops, I will not take much of your time, so that we may quickly get through to our real business, the items on the Agenda.

"I should, however, like to make a few remarks on the state of the rubber and tea industry in Mundakayam, which, I think you will all admit, is in a very flourishing condition, and so long as our horizon is not clouded by some as yet unforeseen trouble—I am sure it will go on flourishing. We have seen a great change in planting methods and opinions in the last 5 years, we have changed the face of the country a good deal in that time, and, last, but not least, I believe, we have succeeded in putting back into our shareholders' pockets a little of the money they have so adventurously entrusted to us. From the best advisers at home, we now know that for a decade at least, we need not fear that old bogey of agriculture, over-production, and that in consequence, except for an incidental rigging of the market, we need not expect large fluctuations in prices such as have been seen during the last four years. The real bogey we have to face, Gentlemen, is of a darker hue, and represents our old friend and enemy, the cooly, and the note of warning which I wish to give in this connection is to beware of cooly rates going higher and higher, as they undoubtedly have been doing during the last decade. It will be a reflection on us as holders of our shareholders purse strings, if our cost of production, more and more every year, approaches the market value of our produce, and it behoves us as an Association to see if we cannot, not only keep rates from going higher, but also reduce them as much as we can, and I, for one, would like to see some Association rates adopted for future working. Advances too, seem to be getting higher and higher, and at the same time labour is not too plentiful, although I believe Mundakayam has been as well off, if not better, in this respect than most districts in South India.

"With regard to the crops we may expect in Mundakayam, I think we may congratulate ourselves that we are getting as much per acre from our rubber, age for age, as our friends in that much vaunted little island, Ceylon, whilst our prices realised are as good as any fetched by any other rubber in the market.

"If we can keep our rates down to their normal level, which is much lower than that of the Straits or Ceylon, there is no reason why S. India Rubber Companies in general and Mundakayam Companies in particular, should not give higher dividends than those concerns whose capital costs are so high, and whose working is so dear, both in Ceylon and the Straits.

"With regard to Tea I have not so much to say, as only one Estate in the District—Peravanthanam—has reached the bearing stage, but from the growth we have, there is every reason to expect as rosy a future for this product as we expect for our rubber.

"The Association has agreed to the employment of a Scientific Officer for the District, and Mr. Nicoll has been asked to see Professor Wallace about the selection of a man likely to prove suitable for us. I trust the scheme will always command the support of the Association members and that those who are not participating in it will see their way to doing so at an early date. There is so much to learn in the finding out of the best method of producing the most latex in our trees, and again in the most economical extraction of it, that in this one branch alone, an alert scientifically trained man should be able to experiment and doubly repay us, by an actual increase of crop per acre, for all that we have decided to expend in this direction.

"In this connection, it has been said, I believe, by an eminent Ceylon Scientist, that Pink disease and Canker have been very prevalent in South India. I should like, here and now, to stoutly deny such an assertion so far as it concerns Mundakayam, and it can be easily disproved by any impartial observer paying a visit to any of the Estates in the District.

"The year has seen the inauguration of the Motor Transport Service which has already much benefitted the Estates who were bold enough to participate in it, and the scope of the service will shortly be extended by an addition of two new cars, after which another opportunity may perhaps be given to Estates to join in the scheme.

"With regard to the iniquitously high rate of freight on rubber to England, which the Association decided to try and get reduced, I am sorry to say that not much has been accomplished. I believe that the freight rates will be discussed and decided on the 30th of June next, however, and I would advise the Association to do its best, before then, to get a promise of a reduction in freight rates. I have been assured that strong representations are being made on our behalf by West Coast firms, and that it is very probable some reduction will be made, but we cannot expect a reduction if we quietly acquiesce in the present rates.

"As to legislation for labour troubles, this is in the air, as also a scheme of registration, which, so long as we have not got extradition will be useless to us. I fear legislation myself, and should be glad to find some master-mind had solved the difficulty for us in some other way.

"In conclusion, Gentlemen, I have to thank you for your hearty support during the term I have held office, and I now beg to place my resignation in your hands."

Mr. Eric Hall moved the adoption of the Chairman's report which was seconded by Mr. Ed. E. Eyre and carried unanimously.

Election of Office-Bearers.—The election of Office-Bearers for 1913 resulted as follows:—

Chairman	...	Mr. G. H. Danvers-Davy.
Vice-Chairman	...	Mr. R. Harley.
Honorary Secretary	...	Mr. Edwin Vincent.

General Committee: Messrs. Hamond, Hall, Murphy, Harley and Kirk.

The Kottayam-Kumili Road.—Mr. Danvers-Davy's resolution regarding the bad state of this road was read, and seconded by Mr. Kirk. The Honorary Secretary was requested to approach Government and ask for an improved road.

Local Building Rates.—Mr. Hamond's resolution to fix these in the district having been put to the meeting, Mr. Kirk proposed that the meeting go into Committee which was unanimously carried. In Committee the matter was freely discussed and it was eventually decided to ask the Committee to go into the question and report at the next meeting.

Irregularities of the Poncunnam Munsiff's Court.—Mr. Kirk put the following resolutions before the meeting:—

1. That the Honorary Secretary write to the Poncunnam Munsiff and ask for an enquiry into the illegal arrest of a member of this Association.
2. That the Munsiff be requested to give notice to the Honorary Secretary of all days when Court will not be held at Poncunnam and that this notice be immediately posted in the Mundakayam T. B.

Seconded by Mr. Hamond. The Honorary Secretary was requested to take the matter up.

Local Registration of Labour.—Mr. Kirk's proposal regarding this was withdrawn, the papers being left on the table for information of members.

Memorial to the late Fred. H. Hall.—Mr. Kirk circulated a list for subscription to this and it was decided to also erect a memorial to the late R. A. Fraser. The memorials will take the form of two tablets suitably inscribed which will be placed in the Peermade Church. Mr. Kirk very kindly consented to carry the matter through, and it was consequently placed unreservedly in his hands.

The Scientific Officer Scheme.—Mr. Eyre proposed that Mr. Anstead be asked to become an Honorary Member of the Committee. This was seconded by Mr. Gudgeon and carried unanimously. The meeting then proceeded with the election of two members on the Committee in place of Mr. Danvers-Davy, Chairman and Ex-Officio member, and the late Mr. R. A. Fraser.

Mr. J. R. Vincent and Mr. Eric Hall were elected.

Date and Place of next Meeting.—Mr. Murphy very kindly placed his Bungalow at the disposal of the members. The meeting will take place on Saturday May 3rd, 1913.

Hearty votes of thanks to the Chairman, proposed by Mr. Hamond and to the Honorary Secretary, proposed by Mr. Eric Hall, were unanimously carried and the meeting then terminated.

(Signed) G. H. DANVERS-DAVY, *Chairman.*

(") EDWIN VINCENT, *Hony. Secretary.*

SOILS.

Nitrogenous Soil Constituents and their Bearing on Soil Fertility.

The following is a summary in their own words of a Bulletin written by Meyers, O. Schreiner and J. J. Skinner issued by the Bureau of Soils of the U. S. Department of Agriculture.

A large number of organic compounds have been isolated from the soil covering a wide range of chemical substances. They are represented by Hydrocarbons, consisting of carbon and hydrogen only by oxygenated compounds like the acids, fats, resins, alcohols, esters and waxes, consisting of carbon hydrogen and oxygen, as well as by a large group of nitrogenous compounds that consist of carbon, hydrogen, oxygen, and nitrogen. These nitrogenous compounds contain the nitrogen combined in different forms, as for instance with carbon only, as the amino group NH_2 , or as the imino group NH . Most of the compounds isolated from the soil are decomposition products of proteins, nucleo-proteins, nucleic acids, lecithins, and similar complex nitrogenous compounds of biological origin.

There can be little doubt that organic constituents of the soil or nutrient solution are absorbed directly by the roots of plants, and enter into the cells reacting with the cell contents and producing effects which differ according to the nature of the compound absorbed. The function through which plants absorb organic soil constituents is in every respect similar to that exhibited by plants with the mineral nutrients.

A plant is able to take in each cubic centimeter of water that it absorbs a greater concentration of minerals than is contained in the original solution with the result that the original culture of soil solution loses its mineral nutrients faster than it does its water. For this reason culture solutions must be frequently changed, and in the case of the soil solution in situ it must be resupplied by solution from the store of fertilizer elements in the soil or by movement of the solution itself, and possibly also by movement of the roots by growth into new territory. Not only does the absorbing power of the root enable the plant to take more nutrients per cubic centimeter of water absorbed than is contained in the same volume of the soil solution, but it also enables the plant to obtain a different ratio of the mineral nutrients for its use that exists in the nutrient solution. While the plant possesses the power to absorb more readily those constituents it needs in its metabolism, it is, nevertheless, not able to wholly exclude undesirable or useless constituents, and thus it happens that it even absorbs those which interfere with its growth and normal development.

This property of plants to absorb the mineral constituents from the soil solution is nowise different in respect to the soluble organic substances in the soil solution, and these organic substances produce various effects upon the plant absorbing them and in some cases they react with the protoplasm of the plant. There are many organic substances that exhibit no detrimental effect, but rather produce an increase in growth and altogether a better plant development. Such for instance are Creatine, Creatinine, Histidine, Arginine, Nucleic acid, Hypoxanthine, and Asparagine. The plants absorb and use such nitrogenous soil constituents as these whether nitrates are present in the soil or not, the effect on growth being much more marked when no nitrate is present, the compounds being directly absorbed and assimilated.

The soil compounds beneficial to growth are among the unit parts of which the complex constituents of every life cell are built; that is they are

the units obtained when one of the complex proteins, nucleo-proteins, etc., are resolved into a simpler compound by chemical means. Take for instance a nucleo-protein. This complex can be split into a protein and a nucleic acid. The protein can be further split into a number of smaller units which are known as splitting products of protein or primary degradation products. These units of bricks out of which the complex structure of the protein is built comprise such compounds as histidine arginine, etc., and others still simpler in composition. This process of taking the complex molecule apart into these units is accomplished by fairly simple means. To effect further decomposition of these units means more deep seated changes, an actual breaking up of the bricks themselves, as it were. In this process ammonia, acids, phenols, and the like are formed. In the soil as is well known the ammonia is again changed to nitrite and nitrate, and thus according to most authorities, the nitrogen cycle is completed and ready to start again on its mission of producing plant protein.

Let us also trace the "building down" of the nucleic acid, which was one of the component parts of the nucleo-protein used above as an illustration. Like the protein part, nucleic acid yields smaller parts or bricks. The unit bricks of the structure of nucleic acid comprise such compounds as hypoxanthine xanthine, guanine adenine, cytosine, pentose sugars, phosphoric acid, and others. All of these have been found in soils. Like the splitting products of the proteins, these compounds can and do suffer further decomposition in the soil, the nitrogen appearing first as ammonia then nitrite, and nitrate as before; but again these changes mean the breaking up of the unit bricks which composed the nucleic acid structure.

The proteins, nucleo-proteins, and nucleic acid are essential to all animal and vegetable growth. That the plant can build these compounds with nitrate and ammonia as the source of the nitrogen has been definitely shown for a long time. In the case of the animal it is just as certain that it cannot build up tissue with nitrate and ammonia as the source of nitrogen. The animal obtains its nitrogen for protein building from the organic nitrogen compounds of plants and other animals. Hence has arisen the popular conception that plants build up complex protein compounds from mineral salts, and from minerals salts only, that is, that plants differ fundamentally in their function from animals.

The animal in order to obtain the elements for building its own protein, resolves by the process of digestion the protein materials of ingested vegetable or animal food into the units or bricks above mentioned, and then builds out of these units its own protein. If, in a restricted diet, certain of these units are excluded, improper nutrition results. All of the units must be potentially in the food of the animal or be formed in the digestive tract.

While the plant is able to build up the complex protein substances in its tissues from nitrate and even ammonia, it does not make this complicated chemical transformation in one step. While this process is but little understood it is certain that there must be intermediate products, and that these are the same products as the degradation units above mentioned is more than probable. Many of these have been found in plant tissues as such. It seems logical therefore that if the plant absorbs such units of tissue building from the soil that it uses them just as if they were produced within the plant itself. Nitrate presents nitrogen in a highly oxidised form. The nitrogen in organic combination in the plant is always in a greatly reduced form. It follows that much energy can be expended otherwise, and hence plant efficiency is increased and growth augmented when the

plant obtains compounds which will serve as these builders directly from the soil.

The results obtained in cultural work with such nitrogenous constituents lead to the suggestion that this theory is an explanation of their action when alone and in conjunction with nitrate, namely, that the compounds are absorbed as such and utilised directly for building up the proteins and the other complex nitrogenous constituents of vegetable material. It seems reasonable to suppose that the unit parts of the complex protein molecules, when presented to the plant, will be used by it in preference to expending energy on the nitrate to prepare these units. If a soil be liberally supplied with all these units it is conceivable that good plant growth will result even without nitrate. If only a limited amount or kind of the units be present the plant must have nitrate with which to supply the missing units.

In the light of this theory it is clear that a single compound or brick cannot be used to build the whole structure. Nitrate is therefore required for maximum effect, so that other compounds or units can be formed. It is, of course, conceivable and this conception forms part of this theory that the plants enzymes may be able to transform one of these units into other closely related units, such as for instance, the change from guanine to xanthine, as well as ammonium compounds. If, however, only a single compound or brick is supplied in the absence of other sources of nitrogen there should be a limit beyond which the plant can make no further use thereof, because of the fact that the entire protein structure cannot thus be built up. Such a limit is in fact proved by experiment.—R. D. A.

CORRESPONDENCE.

THE EDITOR,

The Planters' Chronicle.

Dear Sir,—Will experienced Tea Planters kindly say what is the defect in manufacture when the infusion in the cup opens out flat instead of preserving any of its twist? I think this results from error in withering, but no doubt from their greater experience some Tea Planter will kindly enlighten me.

Yours faithfully,

ENQUIRER.

RHODESIAN RUBBER.

Rhodesia is apparently to make a bid for a place in the rubber market. There is much of importance concerning minerals the output of gold was a record—agriculture, cotton and tobacco in the report of the British South African Company, but the paragraph that specially catches our eye is that relating to rubber. That Northern Rhodesia is rich in various species of rubber-producing vines, shrubs, and plants, we know, and the board is satisfied that the time has arrived when an outlay upon machinery for the extraction of rubber is fully justified. The rubber will not be obtained by purchase from native collectors ranging over wide areas of territory, but will be extracted by the company's own employees from the plants growing, and to be grown, on its properties. Operations will be commenced on an estate situated in a promising vine-rubber area, but it is fully anticipated that the undertaking will be capable of considerable expansion. The African Lakes Corporation, Ltd., which has worked a certain amount of vine rubber successfully in Nyassaland, will give the B. S. A. Co. the benefit of its experience. We do not anticipate that the Rhodesian output will be very great, but rubber may be helpful as a source of revenue, and the experiment will be watched with interest.—*The Rubber World.*